

ON TWO NEW SPECIES OF *DIORCHIS* (CESTODA) FROM THE INDIAN COLUMBIIFORMES.

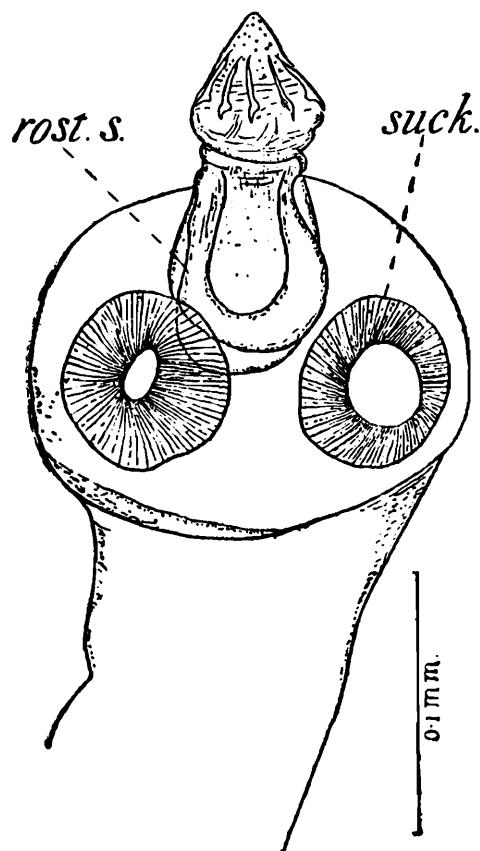
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The material described in this paper was collected during the Summer 1938 from Pilibhit, U. P., India.

***Diorchis alvedea*, sp. nov.**

Host.—*Streptopelia orientalis* (Latham, 1790).

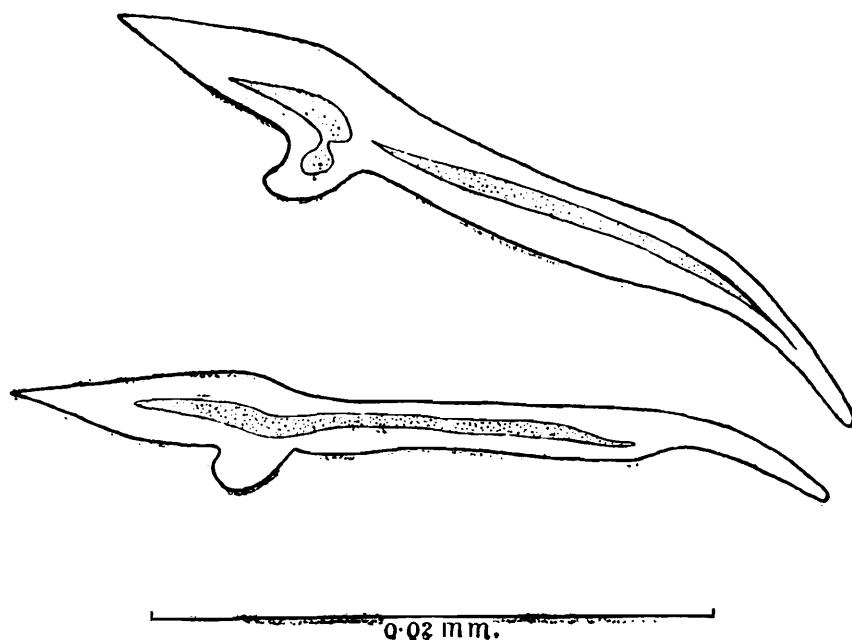
Length 47 mm., maximum breadth 0.43 mm. Scolex (text-fig. 1) 0.165—0.175 mm. in diameter. Rostellar sac 0.084 mm. long \times 0.06—0.065 mm. in diameter, not extending to lower margin of suckers.



TEXT-FIG. 1.—*Diorchis alvedea*, sp. nov., Scolex.

Rostellum 0.053 mm. in diameter ; rostellar hooks (text-fig. 2) 10, 0.029—0.032 mm. long. Genital pores irregularly alternating, at the middle of the proglottis margin, sometimes slightly anterior or posterior to it. Cirrus sac in fully mature segments (text-fig. 3) 0.16—0.193 mm. \times 0.035—0.042 mm. and in gravid segments 0.22—0.25 mm. \times 0.05 mm. ; usually obliquely placed and extending well past longitudinal

excretory vessel, up to middle or even a little more of proglottis breadth. Cirrus is studded with numerous spines. External and internal



TEXT-FIG. 2.—*Diorchis alvedea*, sp. nov., Rostellar hooks.

vesiculae seminalis present, more prominent in gravid segments. Testes, 0.047—0.07 mm. in diameter; are also located out of longitudinal excretory vessel. From the study of all available mature segments, it is concluded that the position of the testes varies greatly as shown in Table 1.

TABLE 1.

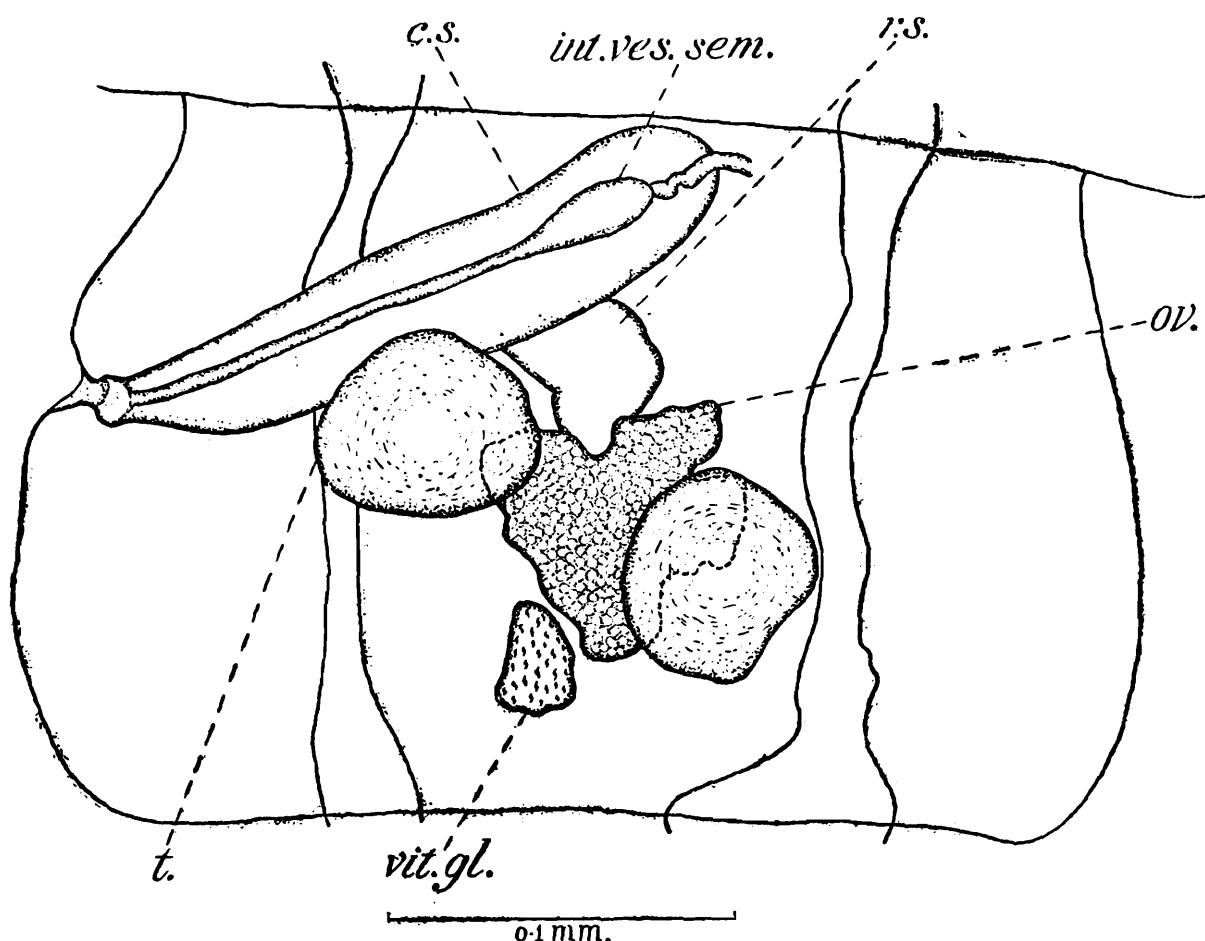
Variation in position of testes.

| | Positions | Percentage |
|----|---|------------|
| 1. | — \bullet or — \bullet or — \circ ; | 26.5 |
| 2. | — \bullet or — \bullet ; | 22.4 |
| 3. | — \bullet ; | 18.3 |
| 4. | — \circ or — \bullet ; | 14.22 |
| 5. | — \circ ; | 10.11 |
| 6. | — \bullet or — \circ ; | 4.08 |
| 7. | — \circ ; (<i>Hymenolepis</i> type) | 4.08 |

—, Genital pore; \circ , Ovary; \bullet , Testis.

Vagina opens into genital cloaca ventral to cirrus sac. Receptaculum seminis present. Uterus develops as a simple (more or less spherical) sac, usually in the form of two spherical portions side by side, separated

by a central portion, extending the whole breadth of the segment beyond longitudinal excretory vessels. In some segments, the uterine extensions are placed anterior and posterior to each other. Eggs 0.015—0.02 mm. \times 0.012—0.013 mm., oncosphere 0.01—0.012 mm. \times 0.007—0.008 mm.



TEXT-FIG. 3.—*Diorchis alvedea*, sp. nov., Mature proglottis.

Remarks.—All species of the genus *Diorchis*, so far as are known to the author, are listed in Table 2. The markedly different sizes of the rostellar hooks differentiate groups A, B, and D from the present form. In group C, 1/0.6 produces a significant difference in shape: this excludes *D. jacobii* Führmann 1932, *D. excentricus* Mayhew 1925, *D. nyrocae* Yamaguti 1935, *D. acuminata* Clerc 1903, and *D. lintoni*, nom. nov. (*D. acuminata* Linton 1927). Of the remainder, the failure of the cirrus sac to extend to the midline of the proglottis, separates *D. acuminata* (Clerc 1902) Lühe 1910, and *D. ransomi*, nom. nov. (*D. acuminata* Ransom 1909). The literature belonging to *D. acuminata* (Clerc 1902) is unfortunately not at the disposal of the author: the species is, however, recorded from the hosts other than the present one. *D. microcirrosa* Mayhew 1929 has larger eggs, testes confined within longitudinal excretory vessels or at most not extending beyond them, and a slightly different shape of the rostellar hooks. In Group E the larger size of the cirrus sac distinguishes, *D. spiralis* Szpotanska 1931, and the extension of the cirrus sac to the aporal margin *D. longicirrosa* Meggitt 1927. For the reception of the form under discussion, therefore, a new species must be created, for which the name *D. alvedea* is proposed.

TABLE 2.

Diorchis Clerc 1903.

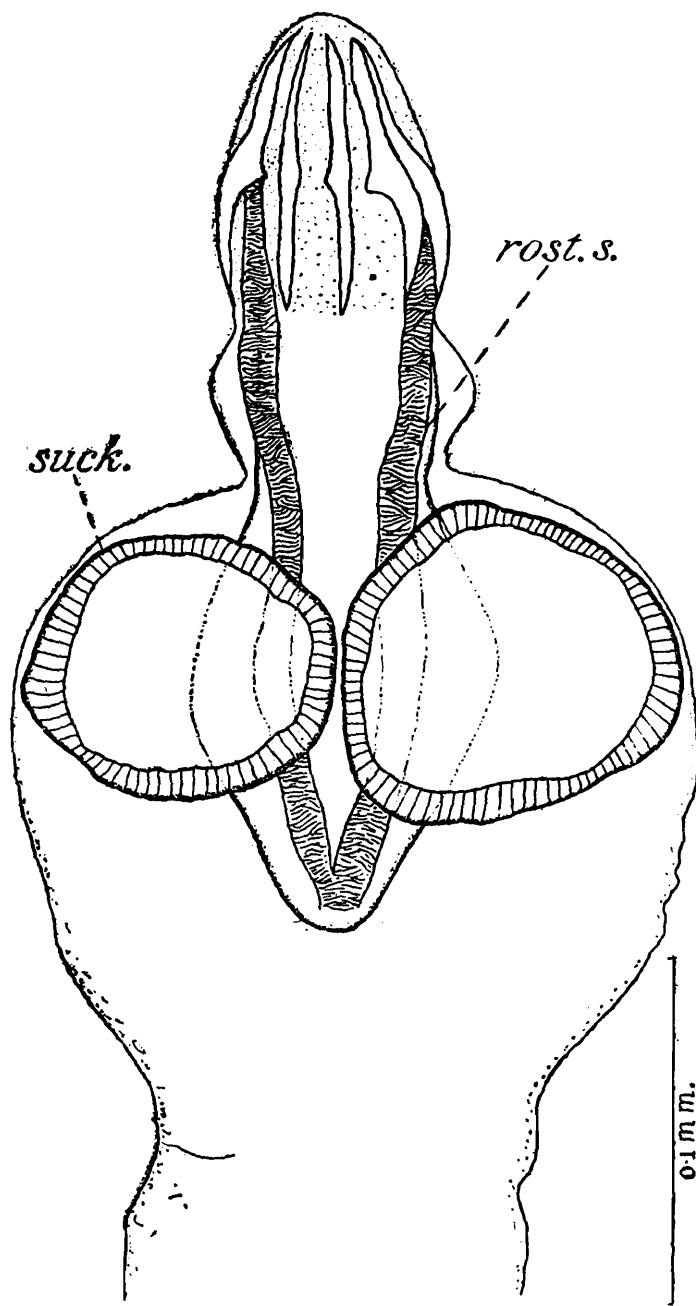
| — | Species. | Rostellar hooks (in μ). | Distance between point and guard of Rost. hook. | Total length of Ros- stellar hook. | Cirrus sac extent. | Cirrus sac length (in μ). |
|---|---|---------------------------------|---|---------------------------------------|---|-----------------------------------|
| | | | | | | |
| A | <i>magnicirrosa</i> Moghe & Inamdar 1934 | 60 | | 1/3·2 | Over $\frac{1}{2}$ prog. | ? |
| | <i>americana</i> Ransom 1909 | 65—66 | | 1/2·7—3·0 | Over $\frac{1}{2}$ prog. | 250-300 |
| | <i>bulbodes</i> Mayhew 1929 | 65—70 | | 1/2·83 | $\frac{1}{2}$ prog. | ? |
| | <i>flavescens</i> (Krefft 1871) | 68 | | 1/3·0—3·27 | $\frac{1}{2}$ or over $\frac{1}{2}$ prog.. | 270-350 |
| | <i>inflata</i> (Rudolphi 1819) | 73 | | 1/2·6—3·0 | Over $\frac{1}{2}$ prog. | ? |
| B | <i>visayana</i> Tubangui & Masilungan 1937 .. | 48—50 | | 1/4·1 | Over $\frac{1}{2}$ prog. | 280-400 |
| | <i>spinata</i> Mayhew 1929 | 46—48 | | 1/3·0 | $\frac{1}{2}\cdot\frac{3}{4}$ prog., often to aporal excretory vess. | ? |
| C | <i>jacobii</i> Führmann 1932 | 23 | | 1/2·75 | less than $\frac{1}{2}$ prog., past 1. ex. vess. | ? |
| | <i>excentricus</i> Mayhew 1925 | 26—31 | | 1/5·3 | just past 1. ex. vess. | ? |
| | <i>nyrocae</i> Yamaguti 1935 | 27 | | 1/4·2 | $\frac{1}{2}$ prog. (by figure) | 120-140 |
| | <i>acuminata</i> Clerc 1903 | 27—39 | | 1/2·8 | less than $\frac{1}{2}$ prog. | 150-160 |

| | | | | | |
|---|---|-------|-----------|--|---|
| | „ Lühe 1910 | 27—39 | 1/3·0 | $\frac{1}{3}$ prog. | 150-160 |
| | „ (Clerc 1902a) .. | ? | 1/3·4 | ? | ? |
| | <i>ransomi</i> , nom. nov. pro <i>D. acuminata</i> Ransom 1909. | 38 | 1/3·1 | not reaching $\frac{1}{2}$ prog. | 180-280 |
| | <i>lintoni</i> , nom. nov. pro <i>D. acuminata</i> Linton 1927. | 50 | 1/4·7 | not reaching $\frac{1}{2}$ prog. (by fig.) | ? |
| | <i>microcirrosa</i> Mayhew 1929 | 29—32 | 1/3·2 | $\frac{1}{2}$ prog. | ? |
| D | <i>parviceps</i> (Linstow 1872) | 12 | 1/3·0 | $\frac{1}{2}$ prog. | ? |
| | <i>kodonodes</i> Mayhew 1929 | 17 | 1/3·3 | not $\frac{1}{2}$ prog. in early stage of development. to ap. ex. vessels at a later stage | ? |
| E | <i>longicirrosa</i> Meggitt 1927 | ? | ? | Over $\frac{1}{2}$ prog., to ap. margin. | 140-180 (mature Segt.) 240-250 (Gravid Segt.) |
| | <i>spiralis</i> Szpotanska 1931 | ? | ? | | 400 |
| F | <i>alvedea</i> , sp. nov. | 29—32 | 1/3·61 | $\frac{1}{2}$ —over $\frac{1}{2}$ prog. (oblique disposition). | 160-193 (mature Segt.) 220-250 (Gravid Segt.) |
| | <i>chalcophapsi</i> , sp. nov. | 84—92 | 1/1·9—2·0 | $\frac{3}{4}$ prog. touching ap. ex. vessels. | 260-290 |

Diorchis chalcophapsi, sp. nov.

Host.—*Chalcophaps indica* (Linnæus, 1758).

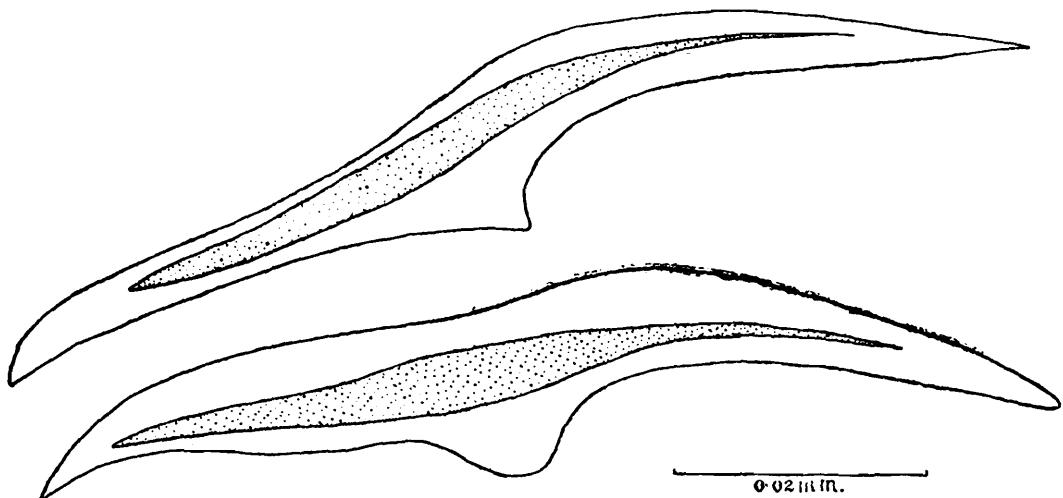
Length 102 mm., maximum breadth 0.5 mm. Scolex (text-fig. 4) nearly globular, slightly elongated, 0.205 mm. in maximum diameter



TEXT-FIG. 4.—*Diorchis chalcophapsi*, sp. nov., Scolex.

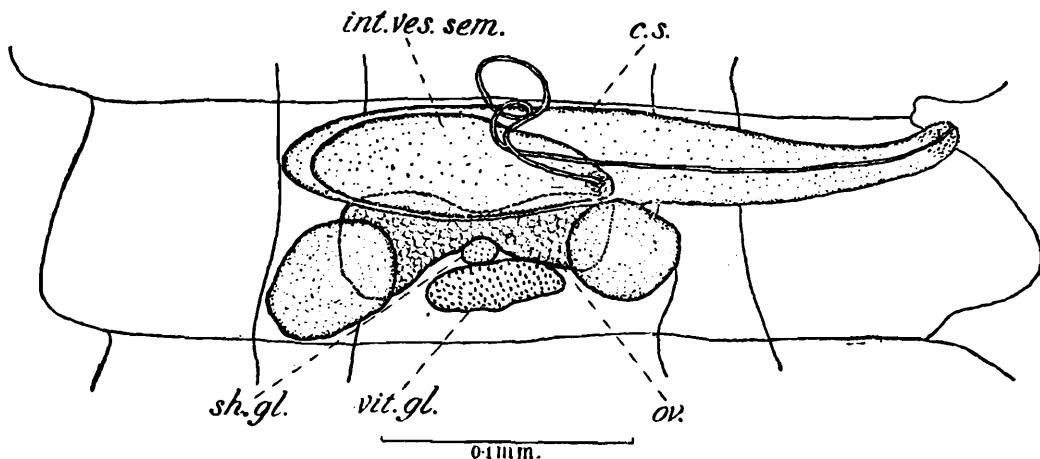
Rostellum cylindrical when protruded, usually broader at the base than at the tip, 0.136 mm. long and 0.064—0.078 mm. broad. Rostellar hooks (text-fig. 5) 8, 0.084—0.092 mm. long. Rostellar sac 0.178 mm. long and 0.088 mm. in maximum diameter extending below the lower margin of the suckers. Suckers nearly spherical 0.076—0.1 mm. in diameter, unarmed and situated at the anterior border of the scolex. Genital pore at the anterior part of the proglottis margin. Cirrus sac 0.26—0.29 mm. \times 0.043—0.048 mm. crossing ventral longitudinal excretory vessel and extending up to or touching aporal excretory vessel, occupying usually anterior portion of the proglottis (text-fig. 6).

Cirrus sac armed, when protruded it can be distinguished into two regions: the basal one is slightly swollen and the terminal one is



TEXT-FIG. 5.—*Diorchis chalcophapsi*, sp. nov., Rostellar hooks.

elongated. Internal vesicula seminalis very well developed, 0.105—0.125 mm. \times 0.03—0.042 mm. Testes 0.045—0.058 mm. in diameter, are separated from each other, and the early stages of ovary and vitelline gland begin their development in the intervening area. Ovary usually



TEXT-FIG. 6.—*Diorchis chalcophapsi*, sp. nov., Mature proglottis.

bilobed with each limb extending towards the testis or a portion of it coming actually underneath it. A vitelline gland is placed posterior to ovary, and is often distinguished with 2-3 small lobes. A small shell gland is in between the ovary and vitelline gland. The uterus is an irregularly branched sac extending beyond the longitudinal excretory vessels. The eggs are not fully formed, hence the details are not clear.

The present form is easily distinguished from all other species of the genus as detailed in Table 2 and therefore it is necessary to create a new species, *Diorchis chalcophapsi*, for its reception.

Consultation of the literature on *D. acuminata* (Clerc 1902) revealed discrepancies: Linton (1927) described a species from *Marila americana* (Anseriformes) with rostellar hooks 50 μ long, in shape (text-fig. 7) and the distance between point and guard of rostellar hook/total length of the rostellar hook, being equal to 1/4.7; and a length of 176 mm. These

characters fall without the limit of variability and the form, therefore, can not be included in *D. acuminata*. The size and the shape of the



TEXT-FIG. 7.—*Diorchis lintoni*, nom. nov.
(*Diorchis acuminata* Linton 1927). Rostellar hook.

rostellar hooks, and the extent of cirrus sac (Table 2) differentiate it from the remaining species. It is, therefore, necessary to create for it a new species for which I propose the name, *D. lintoni*.

As has already been suggested by Führmann (1932), Clerc's original species is probably a confusion of two species, that recorded by Ransom (1909) was 35 mm. long, has rostellar hooks 38 μ long with a distinct guard, cirrus sac 180-280 μ , and an extensive ovary : gravid segments were not present, host-*Fulica americana* (Ralliformes) ; that recorded by Clerc was 80 mm. long, rostellar hooks 27-39 μ long with or without a guard cirrus sac 150-160 μ , and ovary occupying very little space, hosts-*Anas crecca*, *Anas strepera* (Anseriformes) and *Fulica atra*. (Ralliformes). Assuming Führmann's suggestion to be correct, it appears to the writer that there are two distinct species :

- (a) Rostellar hook 38 μ long, with guard, cirrus sac 180-280 μ long. Hosts—Ralliformes.
- (b) Rostellar hook 27 μ long, with or without guard, cirrus sac 150-160 μ long. Hosts—Anseriformes.

It should be noted that (1) in the measurement 27-39 μ , the larger figure is an increase of approximately 50%. It is difficult to believe that hooks of such a size should vary to such an extent, (2) the cirrus sac of the smaller form without gravid segments, is distinctly longer than that of the larger form with gravid segments ; (3) that, assuming Clerc's figure to be reliable, there is a discrepancy in the shape of the rostellar hooks. There is no evidence for assuming the characters of species (b) correlated together but, in view of Ransom's description of a form investigated by him, it is a plausible assumption. The writer pending a re-examination of Clerc's original material suggests that two species be recognised, *D. ransomi* and *D. acuminata* (Clerc 1902). The larger size and the different shape of the rostellar hooks differentiate, *D. ransomi* from *D. microcirrosa* Mayhew 1929, and *D. acuminata* (Clerc 1902a) from *D. jacobii* Führmann 1932. Clerc's paper (1902a) is not available and his figure can not, therefore, for the present be reconciled with either of the two descriptions.

EXPLANATION OF LETTERING IN TEXT FIGURES.

c. s., cirrus sac ; *int. ves. sem.*, internal vesicula seminalis ; *ov.*, ovary ; *r. s.*, receptaculum seminis ; *rost. s.*, rostellar sac ; *sh. gl.*, shell gland ; *suck.*, sucker ; *t.*, testis ; *vit. gl.*—vitelline gland.

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